US008666590B2

(12) **United States Patent**
Follmer et al.

(10) **Patent No.: US 8,666,590 B2**
(45) **Date of Patent: Mar. 4, 2014**

(54) **SYSTEM AND METHOD FOR NAMING, FILTERING, AND RECALL OF REMOTELY MONITORED EVENT DATA**

(75) Inventors: **Todd Follmer**, Coto de Caza, CA (US); **Scott McClellan**, Heber City, UT (US)

(73) Assignee: **inthinc Technology Solutions, Inc.**, West Valley City, UT (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 311 days.

(21) Appl. No.: **11/767,325**

(22) Filed: **Jun. 22, 2007**

(65) **Prior Publication Data**

US 2008/0319604 A1 Dec. 25, 2008

(51) **Int. Cl.**

G01M 17/00	(2006.01)
G06F 7/00	(2006.01)
G06F 19/00	(2011.01)
G06F 11/30	(2006.01)
G07C 5/00	(2006.01)

(52) **U.S. Cl.**
USPC **701/32.2**; 701/28; 701/29.1

(58) **Field of Classification Search**
USPC 701/35, 1, 24, 28, 36, 29.1, 32.2, 33.3, 701/33.4
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,767,325	A *	6/1930	Taylor	294/82.16
3,975,708	A	8/1976	Lusk	
4,369,427	A	1/1983	Drebinger et al.	
4,395,624	A	7/1983	Wartski	
4,419,654	A	12/1983	Funk	
4,458,535	A	7/1984	Juergens	
4,785,280	A	11/1988	Fubini	
4,926,417	A	5/1990	Futami	
4,939,652	A	7/1990	Steiner	
5,032,821	A	7/1991	Domanico	
5,119,504	A	6/1992	Durboraw, III	
5,223,844	A	6/1993	Mansell et al.	
5,225,842	A	7/1993	Brown et al.	
5,303,163	A	4/1994	Ebaugh et al.	364/550
5,305,214	A	4/1994	Komatsu	
5,309,139	A	5/1994	Austin	
5,311,197	A	5/1994	Sorden et al.	
5,325,082	A	6/1994	Rodriguez	
5,347,260	A	9/1994	Ginzel	
5,359,528	A	10/1994	Haendel	

(Continued)

FOREIGN PATENT DOCUMENTS

CA	2071931	12/1993	
DE	197 00 353 A1	7/1998	B60K 28/00
WO	WO2005109369	11/2005	
WO	WO2008109477	9/2008	

OTHER PUBLICATIONS

Ogle, et al.; *Accuracy of Global Positioning System for Determining Driver Performance Parameters*; Transportation Research Record 1818; Paper No. 02-1063; pp. 12-24.

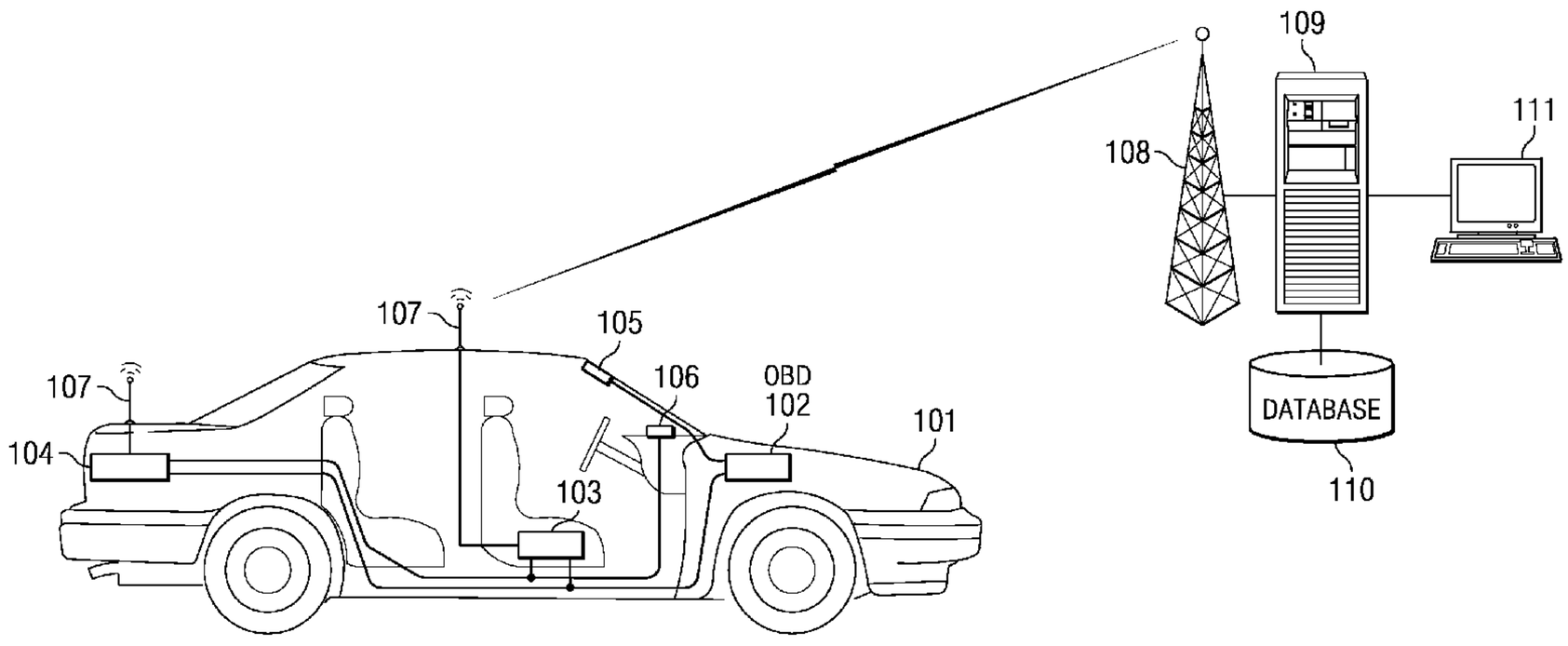
(Continued)

Primary Examiner — Rami Khatib
(74) *Attorney, Agent, or Firm* — Workman Nydegger

(57) **ABSTRACT**

System and method for capturing video data, comprising buffering video data captured from a video recording device in a vehicle, detecting a triggering event, saving a portion of the video data occurring within a specified period of time near the event, and naming a saved portion of video data with a label associated with the triggering event.

45 Claims, 2 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,365,114	A	11/1994	Tsurushima	
5,365,451	A	11/1994	Wang et al.	
5,394,136	A	2/1995	Lammers	
5,400,018	A	3/1995	Scholl	
5,414,432	A	5/1995	Penny, Jr. et al.	
5,422,624	A	6/1995	Smith	
5,424,584	A	6/1995	Matsuda	
5,430,432	A	7/1995	Camhi	
5,436,612	A	7/1995	Aduddell	
5,436,837	A	7/1995	Gerstung	
5,446,659	A	8/1995	Yamawaki	
5,453,939	A	9/1995	Hoffman	
5,457,439	A	10/1995	Kuhn	
5,475,597	A	12/1995	Buck	
5,485,161	A	1/1996	Vaughn	
5,499,182	A	3/1996	Ousborne	
5,521,579	A	5/1996	Bernhard	
5,521,580	A	5/1996	Kaneko	
5,525,960	A	6/1996	McCall	
5,548,273	A	8/1996	Nicol	
5,581,464	A	12/1996	Woll	
5,586,130	A	12/1996	Doyle	
5,600,558	A	2/1997	Mearek	
5,612,875	A	3/1997	Haendel	
5,625,337	A	4/1997	Medawar	
5,638,077	A	6/1997	Martin	
5,642,284	A	6/1997	Parupalli	
5,648,755	A	7/1997	Yagihashi	
5,659,289	A	8/1997	Zonkoski	
5,689,067	A	11/1997	Klein	
5,708,417	A	1/1998	Tallman	
5,717,374	A	2/1998	Smith	
5,719,771	A	2/1998	Buck	
5,723,768	A	3/1998	Ammon	
5,740,548	A	4/1998	Hudgens	
5,742,915	A	4/1998	Stafford	
5,751,245	A	5/1998	Janky et al.	
5,764,139	A	6/1998	Nojima	
5,767,767	A	6/1998	Lima	
5,777,580	A	7/1998	Janky et al.	
5,795,997	A	8/1998	Gittins	
5,797,134	A	8/1998	McMillan et al.	
5,801,618	A	9/1998	Jenkins	
5,801,948	A	9/1998	Wood	
5,815,071	A	9/1998	Doyle	
5,825,283	A	10/1998	Camhi	
5,825,284	A	10/1998	Dunwoody	
5,844,475	A	12/1998	Horie	
5,847,271	A	12/1998	Poublon	
5,862,500	A	1/1999	Goodwin	
5,867,093	A	2/1999	Dodd	
5,877,678	A	3/1999	Donoho	
5,880,674	A	3/1999	Ufkes	
5,880,958	A	3/1999	Helms et al.	
5,883,594	A	3/1999	Lau	
5,892,434	A	4/1999	Carlson	
5,907,277	A	5/1999	Tokunaga	
5,914,654	A	6/1999	Smith	
5,918,180	A	6/1999	Dimino	
5,926,087	A	7/1999	Busch	
5,928,291	A	7/1999	Jenkins et al.	
5,941,915	A	8/1999	Federle et al.	701/1
5,945,919	A	8/1999	Trask	
5,949,330	A	9/1999	Hoffman	
5,949,331	A	9/1999	Schofield	
5,954,781	A	9/1999	Slepian	
5,955,942	A	9/1999	Slifkin	
5,957,986	A	9/1999	Coverdill	
5,964,816	A	10/1999	Kincaid	
5,969,600	A	10/1999	Tanguay	
5,974,356	A	10/1999	Doyle et al.	
5,978,737	A	11/1999	Pawlowski	
5,982,278	A	11/1999	Cuvelier	
5,987,976	A	11/1999	Sarangapani	
5,999,125	A	12/1999	Kurby	
6,002,327	A	12/1999	Boesch	
6,008,724	A	12/1999	Thompson	
6,018,293	A	1/2000	Smith	
6,026,292	A	2/2000	Coppinger et al.	
6,028,508	A	2/2000	Mason	
6,028,510	A	2/2000	Tamam	
6,037,861	A	3/2000	Ying	
6,037,862	A	3/2000	Ying	
6,038,496	A	3/2000	Dobler	
6,044,315	A	3/2000	Honeck	
6,059,066	A	5/2000	Lary	
6,064,928	A	5/2000	Wilson	
6,064,970	A	5/2000	McMillan et al.	
6,067,008	A	5/2000	Smith	
6,067,009	A	5/2000	Hozuka	
6,072,388	A	6/2000	Kyrtsos	
6,073,007	A	6/2000	Doyle	
6,075,458	A	6/2000	Ladner et al.	
6,078,853	A	6/2000	Ebner	
6,081,188	A	6/2000	Kutlucinar	
6,084,870	A	7/2000	Wooten et al.	
6,094,149	A	7/2000	Wilson	
6,098,048	A	8/2000	Dashefsky	
6,100,792	A	8/2000	Ogino	
6,104,282	A	8/2000	Fragoso	
6,108,591	A	8/2000	Segal et al.	
6,121,922	A	9/2000	Mohan	
6,124,810	A	9/2000	Segal et al.	
6,130,608	A	10/2000	McKeown	
6,131,067	A	10/2000	Girerd et al.	
6,133,827	A	10/2000	Alvey	
6,141,610	A	10/2000	Rothert	
6,147,598	A	11/2000	Murphy	
6,172,602	B1	1/2001	Hasfjord	
6,178,374	B1	1/2001	Möhlenkamp et al.	701/117
6,184,784	B1	2/2001	Shibuya	
6,185,501	B1	2/2001	Smith	
6,198,995	B1	3/2001	Settles	
6,204,756	B1	3/2001	Senyk	
6,204,757	B1	3/2001	Evans	
6,208,240	B1	3/2001	Ledesma	
6,212,455	B1	4/2001	Weaver	
6,216,066	B1	4/2001	Goebel	
6,222,458	B1	4/2001	Harris	
6,225,898	B1	5/2001	Kamiya	
6,227,862	B1	5/2001	Harkness	
6,229,438	B1	5/2001	Kutlucinar	
6,232,873	B1	5/2001	Dilz	
6,246,933	B1	6/2001	Bague	
6,247,360	B1	6/2001	Anderson	
6,249,219	B1	6/2001	Perez	
6,253,129	B1	6/2001	Jenkins et al.	
6,255,892	B1	7/2001	Gartner	
6,255,939	B1	7/2001	Roth	
6,262,658	B1	7/2001	O'Connor	
6,265,989	B1	7/2001	Taylor	
6,266,588	B1	7/2001	McClellan	
6,278,361	B1	8/2001	Magiawala	
6,285,931	B1	9/2001	Hattori	
6,289,332	B2	9/2001	Menig	
6,294,988	B1	9/2001	Shomura	
6,294,989	B1	9/2001	Schofield	
6,295,492	B1	9/2001	Lang	
6,297,768	B1	10/2001	Allen, Jr.	
6,301,533	B1	10/2001	Markow	
6,306,063	B1	10/2001	Horgan et al.	477/108
6,308,120	B1	10/2001	Good	
6,308,134	B1	10/2001	Croyle et al.	
6,313,742	B1	11/2001	Larson	
6,320,497	B1	11/2001	Fukumoto	
6,331,825	B1	12/2001	Ladner et al.	
6,333,686	B1	12/2001	Waltzer	
6,337,653	B1	1/2002	Bchler	
6,339,739	B1	1/2002	Folke	
6,339,745	B1	1/2002	Novik	701/208
6,344,805	B1	2/2002	Yasui	
6,351,211	B1	2/2002	Bussard	

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,356,188	B1	3/2002	Meyers	
6,356,822	B1	3/2002	Diaz	
6,356,833	B2	3/2002	Jeon	
6,356,836	B1	3/2002	Adolph	701/208
6,359,554	B1	3/2002	Skibinski	
6,362,730	B2	3/2002	Razavi	
6,362,734	B1	3/2002	McQuade	
6,366,199	B1	4/2002	Osbom	
6,378,959	B2	4/2002	Lesesky	
6,389,340	B1	5/2002	Rayner	
6,393,348	B1	5/2002	Ziegler	
6,404,329	B1	6/2002	Hsu	
6,405,112	B1	6/2002	Rayner	
6,405,128	B1	6/2002	Bechtolsheim et al.	701/208
6,415,226	B1	7/2002	Kozak	701/210
6,424,268	B1	7/2002	Isonaga	
6,427,687	B1	8/2002	Kirk	
6,430,488	B1	8/2002	Goldman	
6,433,681	B1	8/2002	Foo	
6,441,732	B1	8/2002	Laitsaari	
6,449,540	B1	9/2002	Rayner	
6,459,367	B1	10/2002	Green	
6,459,369	B1	10/2002	Wang	
6,459,961	B1	10/2002	Obradovich	
6,459,969	B1	10/2002	Bates	
6,462,675	B1	10/2002	Humphrey	
6,472,979	B2	10/2002	Schofield	
6,476,763	B2	11/2002	Allen, Jr.	
6,480,106	B1	11/2002	Crombez	
6,484,035	B2	11/2002	Allen, Jr.	
6,484,091	B2	11/2002	Shibata	
6,493,650	B1	12/2002	Rodgers	
6,512,969	B1	1/2003	Wang	
6,515,596	B2	2/2003	Awada	
6,519,512	B1	2/2003	Haas	
6,525,672	B2	2/2003	Chainer	
6,526,341	B1	2/2003	Bird et al.	
6,529,159	B1	3/2003	Fan et al.	
6,535,116	B1	3/2003	Zhou	
6,542,074	B1	4/2003	Tharman	
6,542,794	B2	4/2003	Obradovich	
6,549,834	B2	4/2003	McClellan	
6,552,682	B1	4/2003	Fan	
6,556,905	B1	4/2003	Mittelsteadt	
6,559,769	B2	5/2003	Anthony	
6,564,126	B1	5/2003	Lin	
6,567,000	B2	5/2003	Slifkin	
6,571,168	B1	5/2003	Murphy	
6,587,759	B2	7/2003	Obradovich	
6,594,579	B1	7/2003	Lowrey	
6,599,243	B2	7/2003	Woltermann	
6,600,985	B2	7/2003	Weaver	
6,604,033	B1	8/2003	Banet	
6,609,063	B1	8/2003	Bender et al.	701/209
6,609,064	B1	8/2003	Dean	701/213
6,611,740	B2	8/2003	Lowrey	
6,611,755	B1	8/2003	Coffee	
6,622,085	B1	9/2003	Amita et al.	701/208
6,629,029	B1	9/2003	Giles	
6,630,884	B1	10/2003	Shanmugham	
6,631,322	B1	10/2003	Arthur et al.	701/211
6,636,790	B1	10/2003	Lightner	
6,639,512	B1	10/2003	Lee et al.	
6,643,578	B2	11/2003	Levine	
6,651,001	B2	11/2003	Apsell	
6,654,682	B2	11/2003	Kane et al.	
6,657,540	B2	12/2003	Knapp	
6,662,013	B2	12/2003	Takiguchi et al.	
6,662,141	B2	12/2003	Kaub	702/181
6,664,922	B1	12/2003	Fan	
6,665,613	B2	12/2003	Duvall	
6,674,362	B2	1/2004	Yoshioka	
6,675,085	B2	1/2004	Straub	
6,677,854	B2	1/2004	Dix	
6,678,612	B1	1/2004	Khawam	
6,696,932	B2	2/2004	Skibinski	
6,703,925	B2	3/2004	Steffel	
6,710,738	B2	3/2004	Allen, Jr.	
6,714,894	B1	3/2004	Tobey et al.	702/188
6,718,235	B1	4/2004	Borugian	
6,718,239	B2	4/2004	Rayner	
6,727,809	B1	4/2004	Smith	
6,728,605	B2	4/2004	Lash	
6,732,031	B1	5/2004	Lightner	
6,732,032	B1	5/2004	Banet	
6,737,962	B2	5/2004	Mayor	
6,741,169	B2	5/2004	Magiawala	
6,741,170	B2	5/2004	Alrabady	
6,745,153	B2	6/2004	White	
6,748,322	B1	6/2004	Fernandez	
6,750,761	B1	6/2004	Newman	
6,750,762	B1	6/2004	Porter	
6,756,916	B2	6/2004	Yanai	
6,759,952	B2	7/2004	Dunbridge	
6,766,244	B2	7/2004	Obata et al.	701/207
6,768,448	B2	7/2004	Farmer	
6,775,602	B2	8/2004	Gordon	
6,778,068	B2	8/2004	Wolfe	
6,778,885	B2	8/2004	Agashe et al.	
6,784,793	B2	8/2004	Gagnon	
6,784,832	B2	8/2004	Knockeart et al.	
6,788,196	B2	9/2004	Ueda	
6,788,207	B2	9/2004	Wilkerson	
6,792,339	B2	9/2004	Basson	
6,795,017	B1	9/2004	Puranik et al.	
6,798,354	B2	9/2004	Schuessler	
6,803,854	B1	10/2004	Adams et al.	
6,807,481	B1	10/2004	Gastelum	
6,813,549	B2	11/2004	Good	
6,819,236	B2	11/2004	Kawai	
6,832,141	B2	12/2004	Skeen et al.	
6,845,314	B2	1/2005	Fosseen	
6,845,316	B2	1/2005	Yates	701/117
6,845,317	B2	1/2005	Craine	
6,847,871	B2	1/2005	Malik et al.	701/33
6,847,872	B2	1/2005	Bodin	
6,847,873	B1	1/2005	Li	
6,847,887	B1	1/2005	Casino	701/208
6,850,841	B1	2/2005	Casino	701/208
6,859,039	B2	2/2005	Horie	
6,859,695	B2	2/2005	Klausner	
6,865,457	B1	3/2005	Mittelsteadt	
6,867,733	B2	3/2005	Sandhu et al.	
6,868,386	B1	3/2005	Henderson et al.	
6,870,469	B2	3/2005	Ueda	
6,873,253	B2	3/2005	Veziris	
6,873,261	B2	3/2005	Anthony	
6,879,894	B1	4/2005	Lightner	
6,885,293	B2	4/2005	Okumura	
6,892,131	B2	5/2005	Coffee	
6,894,606	B2	5/2005	Forbes et al.	340/435
6,895,332	B2	5/2005	King	
6,909,398	B2	6/2005	Knockeart et al.	
6,914,523	B2	7/2005	Munch	
6,922,133	B2	7/2005	Wolfe	
6,922,616	B2	7/2005	Obradovich	
6,922,622	B2	7/2005	Dulin	
6,925,425	B2	8/2005	Remboski	
6,928,348	B1	8/2005	Lightner	
6,937,162	B2	8/2005	Tokitsu	
6,950,013	B2	9/2005	Scaman	
6,954,140	B2	10/2005	Holler	
6,958,976	B2	10/2005	Kikkawa	
6,965,827	B1	11/2005	Wolfson	701/207
6,968,311	B2	11/2005	Knockeart et al.	
6,970,075	B2	11/2005	Cherouny	
6,970,783	B2	11/2005	Knockeart et al.	

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,972,669	B2	12/2005	Saito	
6,980,131	B1	12/2005	Taylor	
6,981,565	B2	1/2006	Gleacher	
6,982,636	B1	1/2006	Bennie	
6,983,200	B2	1/2006	Bodin	
6,988,033	B1	1/2006	Lowrey	
6,988,034	B1	1/2006	Marlatt et al.	701/200
6,989,739	B2	1/2006	Li	
7,002,454	B1	2/2006	Gustafson	
7,002,579	B2	2/2006	Olson	
7,005,975	B2	2/2006	Lehner	
7,006,820	B1	2/2006	Parker et al.	
7,012,632	B2 *	3/2006	Freeman et al.	348/148
7,019,641	B1	3/2006	Lakshmanan	
7,020,548	B2 *	3/2006	Saito et al.	701/32.6
7,023,321	B2	4/2006	Brillon et al.	
7,023,332	B2	4/2006	Saito	
7,024,318	B2	4/2006	Fischer	
7,027,808	B2	4/2006	Wesby	
7,034,705	B2	4/2006	Yoshioka	
7,038,578	B2	5/2006	Will	
7,042,347	B2	5/2006	Cherouny	
7,047,114	B1	5/2006	Rogers	
7,049,941	B2	5/2006	Rivera-Cintron	
7,054,742	B2	5/2006	Khavakh et al.	701/209
7,059,689	B2	6/2006	Lesesky	
7,069,126	B2	6/2006	Bernard	
7,069,134	B2	6/2006	Williams	
7,072,753	B2	7/2006	Eberle	
7,081,811	B2	7/2006	Johnston	
7,084,755	B1	8/2006	Nord	
7,088,225	B2	8/2006	Yoshioka	
7,089,116	B2	8/2006	Smith	
7,091,880	B2	8/2006	Sorensen	
7,098,812	B2	8/2006	Hirota	
7,099,750	B2	8/2006	Miyazawa	
7,099,774	B2	8/2006	King	
7,102,496	B1	9/2006	Ernst	
7,109,853	B1	9/2006	Mattson	
7,113,081	B1	9/2006	Reichow	
7,113,107	B2	9/2006	Taylor	
7,117,075	B1	10/2006	Larschan et al.	
7,119,696	B2	10/2006	Borugian	
7,124,027	B1	10/2006	Ernst	
7,124,088	B2	10/2006	Bauer et al.	
7,129,825	B2	10/2006	Weber	
7,132,934	B2	11/2006	Allison	
7,132,937	B2	11/2006	Lu et al.	
7,132,938	B2	11/2006	Suzuki	
7,133,755	B2	11/2006	Salman	
7,135,983	B2	11/2006	Filippov	
7,138,916	B2	11/2006	Schwartz	
7,139,661	B2	11/2006	Holze	
7,145,442	B1	12/2006	Wai	
7,149,206	B2	12/2006	Pruzan	
7,155,321	B2	12/2006	Bromley et al.	701/29
7,161,473	B2	1/2007	Hoshal	
7,164,986	B2	1/2007	Humphries	
7,170,390	B2	1/2007	Quiñones	
7,170,400	B2	1/2007	Cowelchuk	
7,174,243	B1	2/2007	Lightner	
7,180,407	B1	2/2007	Guo	
7,180,409	B2	2/2007	Brey	
7,187,271	B2	3/2007	Nagata	
7,196,629	B2	3/2007	Ruoss	
7,197,500	B1	3/2007	Israni et al.	707/100
7,216,022	B2	5/2007	Kynast et al.	701/1
7,216,035	B2	5/2007	Hörtner	
7,218,211	B2	5/2007	Ho	
7,222,009	B2	5/2007	Hijikata	
7,225,065	B1	5/2007	Hunt	
7,228,211	B1	6/2007	Lowrey	
7,233,235	B2	6/2007	Pavlish	
7,236,862	B2	6/2007	Kanno	
7,239,948	B2	7/2007	Nimmo	
7,256,686	B2	8/2007	Koutsky	
7,256,700	B1	8/2007	Ruocco	
7,256,702	B2	8/2007	Isaacs	
7,260,497	B2	8/2007	Watabe	
RE39,845	E	9/2007	Hasfjord	
7,269,507	B2	9/2007	Cayford	701/208
7,269,530	B1	9/2007	Lin	
7,271,716	B2	9/2007	Nou	
7,273,172	B2	9/2007	Olsen	
7,280,046	B2	10/2007	Berg	
7,283,904	B2	10/2007	Benjamin	
7,286,917	B2	10/2007	Hawkins	
7,286,929	B2	10/2007	Staton	
7,289,024	B2	10/2007	Sumcad	
7,289,035	B2	10/2007	Nathan	
7,292,152	B2	11/2007	Torkkola	
7,292,159	B2	11/2007	Culpepper	
7,298,248	B2	11/2007	Finley	
7,298,249	B2	11/2007	Avery	
7,301,445	B2	11/2007	Moughler	
7,317,383	B2	1/2008	Ihara	
7,317,392	B2	1/2008	DuRocher	
7,317,927	B2	1/2008	Staton	
7,319,848	B2	1/2008	Obradovich	
7,321,294	B2	1/2008	Mizumaki	
7,321,825	B2	1/2008	Ranalli	
7,323,972	B2	1/2008	Nobusawa	
7,323,974	B2	1/2008	Schmid	
7,323,982	B2	1/2008	Staton	
7,327,239	B2	2/2008	Gallant	
7,327,258	B2	2/2008	Fast	
7,333,883	B2	2/2008	Geborek	
7,339,460	B2	3/2008	Lane	
7,349,782	B2	3/2008	Churchill	
7,352,081	B2	4/2008	Taurasi	
7,355,508	B2	4/2008	Mian	
7,365,639	B2	4/2008	Yuhara	
7,366,551	B1	4/2008	Hartley	
7,375,624	B2	5/2008	Hines	
7,376,499	B2	5/2008	Salman	
7,378,946	B2	5/2008	Lahr	
7,378,949	B2	5/2008	Chen	
7,386,394	B2	6/2008	Shulman	
7,421,334	B2	9/2008	Dahlgren et al.	701/117
7,433,889	B1	10/2008	Barton	707/104.1
7,447,509	B2	11/2008	Cossins et al.	455/457
7,499,949	B2	3/2009	Barton	707/104.1
7,565,230	B2	7/2009	Gardner et al.	701/35
7,706,940	B2 *	4/2010	Itatsu	701/32.6
7,880,642	B2	2/2011	Gueziec	340/905
7,898,388	B2	3/2011	Ehrman et al.	340/5.8
7,941,258	B1	5/2011	Mittelsteadt et al.	701/35
8,150,628	B2 *	4/2012	Hyde et al.	702/19
8,311,277	B2 *	11/2012	Peleg et al.	382/103
2001/0018628	A1	8/2001	Jenkins et al.	701/35
2002/0005895	A1 *	1/2002	Freeman et al.	348/143
2002/0024444	A1	2/2002	Hiyama et al.	340/576
2002/0103622	A1 *	8/2002	Burge	702/183
2003/0055555	A1	3/2003	Knockeart et al.	
2004/0039504	A1	2/2004	Coffee et al.	
2004/0066330	A1	4/2004	Knockeart et al.	
2004/0077339	A1	4/2004	Martens	
2004/0083041	A1	4/2004	Skeen et al.	
2004/0138794	A1 *	7/2004	Saito et al.	701/35
2004/0142672	A1	7/2004	Stankewitz	
2004/0143602	A1 *	7/2004	Ruiz et al.	707/104.1
2004/0210353	A1	10/2004	Rice	701/1
2004/0236474	A1	11/2004	Chowdhary et al.	701/1
2005/0064835	A1	3/2005	Gusler	
2005/0091018	A1	4/2005	Craft	
2005/0096809	A1	5/2005	Skeen et al.	
2005/0137757	A1	6/2005	Phelan et al.	
2006/0080359	A1 *	4/2006	Powell et al.	707/104.1
2006/0154687	A1	7/2006	McDowell	

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0190822	A1*	8/2006	Basson et al.	715/700
2006/0234711	A1	10/2006	McArdle	
2007/0040928	A1*	2/2007	Jung et al.	348/362
2007/0124332	A1*	5/2007	Ballesty et al.	707/104.1
2007/0136078	A1*	6/2007	Plante	705/1
2007/0229234	A1	10/2007	Smith	
2007/0293206	A1	12/2007	Lund	
2008/0064413	A1	3/2008	Breed	
2008/0122603	A1*	5/2008	Plante et al.	340/439
2008/0255888	A1	10/2008	Berkobin	
2010/0033577	A1*	2/2010	Doak et al.	348/159

OTHER PUBLICATIONS

Shen, et al.; *A computer Assistant for Vehicle Dispatching with Learning Capabilities*; Annals of Operations Research 61; pp. 189-211, 1995.

Tijerina, et al.; *Final Report Supplement; Heavy Vehicle Driver Workload Assessment; Task 5: Workload Assessment Protocol*; U.S. Department of Transportation; 69 pages, Oct. 1996.

Myra Blanco; *Effects of In-Vehicle Information System (IVIS) Tasks on the Information Processing Demands of a Commercial Vehicle Operations (CVO) Driver*; 230 pages, 1999.

* cited by examiner

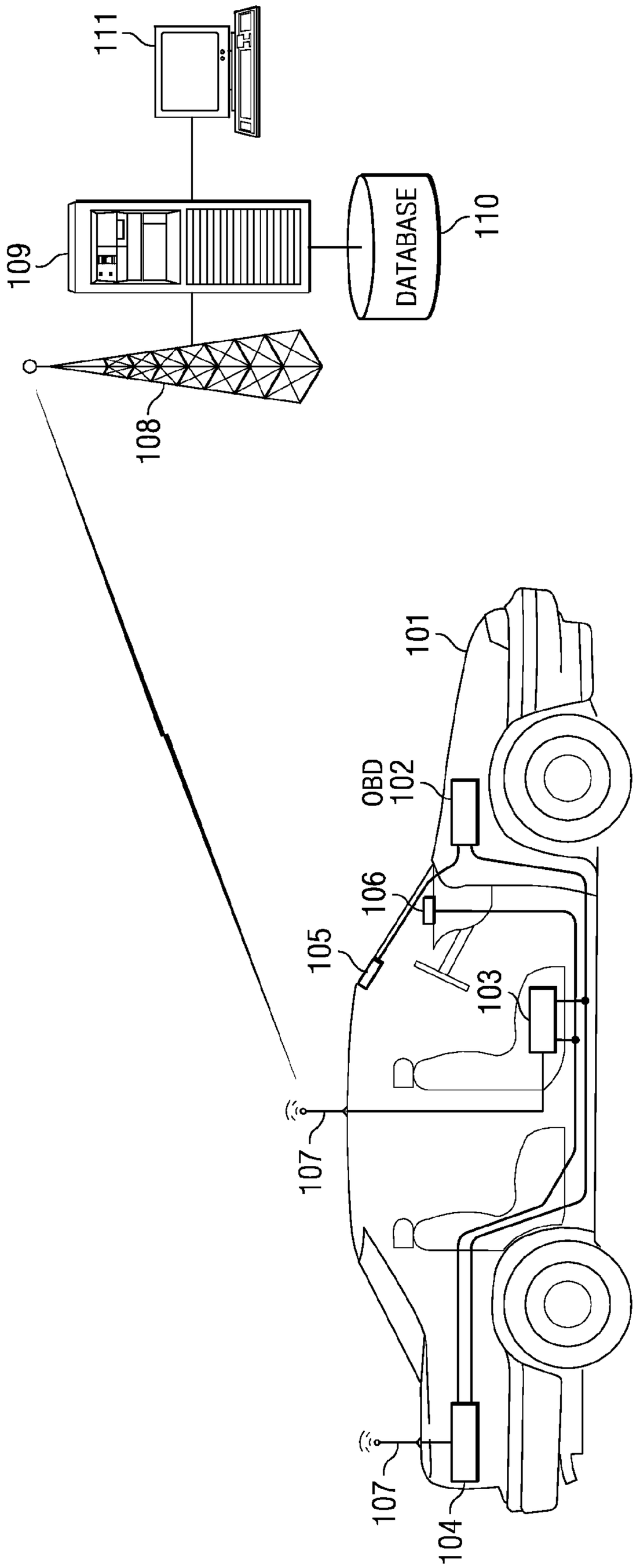


FIG. 1

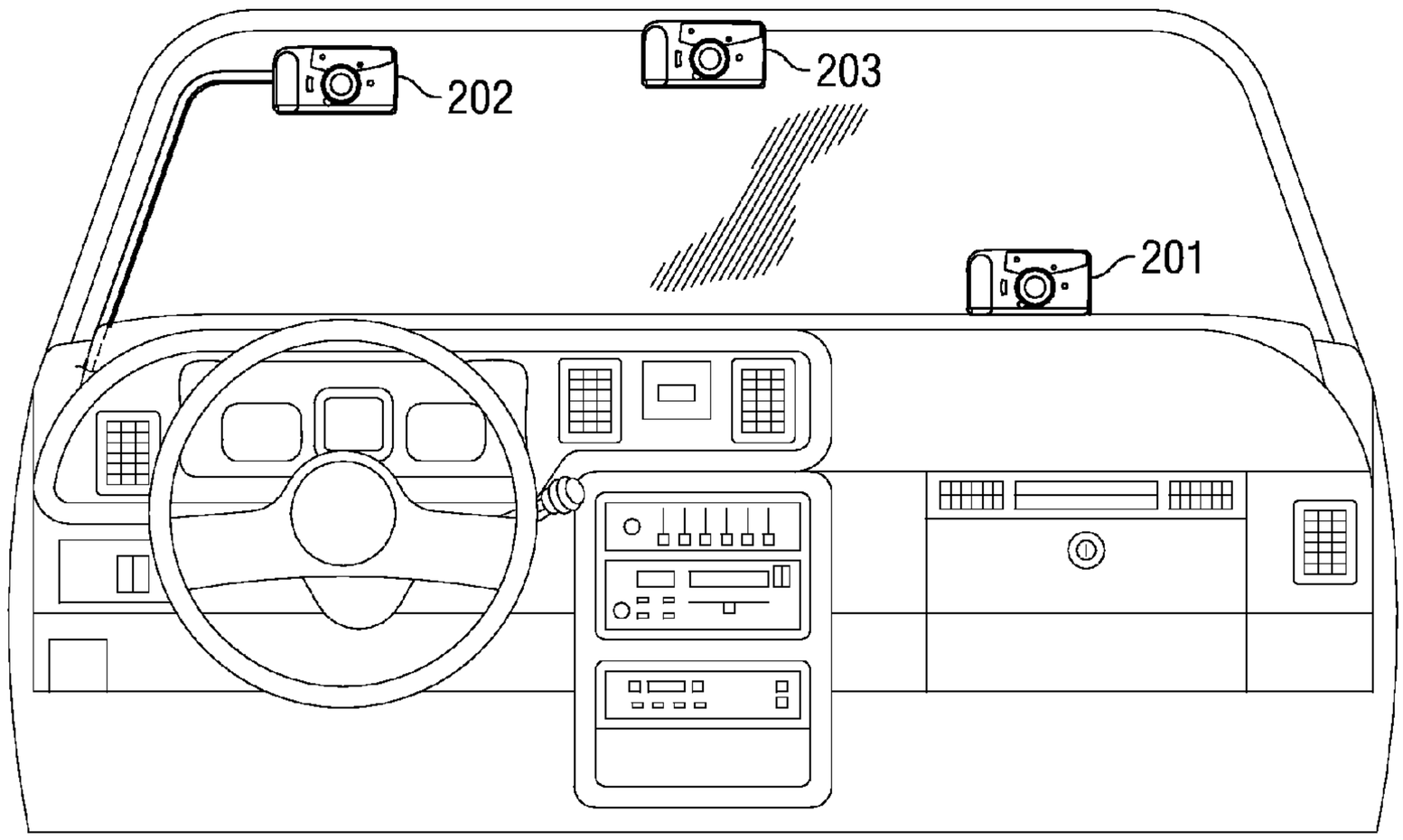


FIG. 2

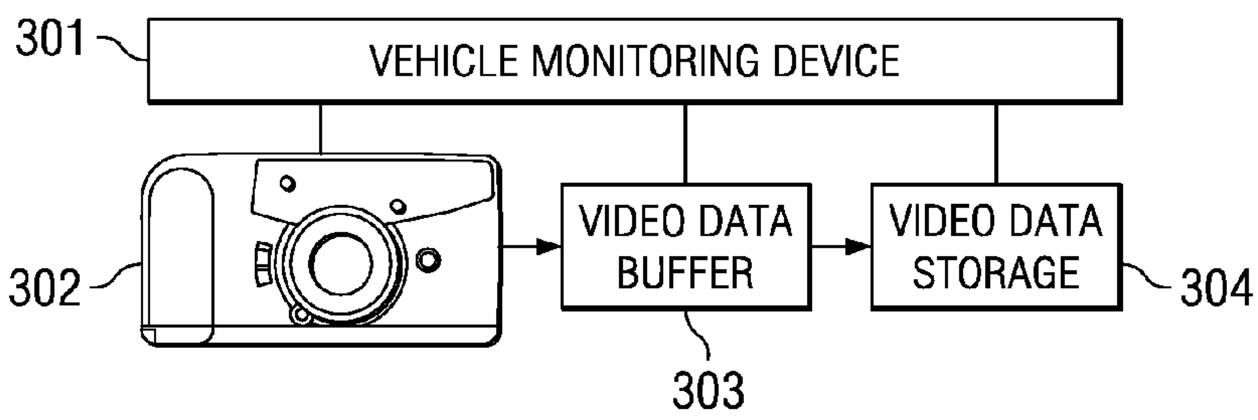


FIG. 3

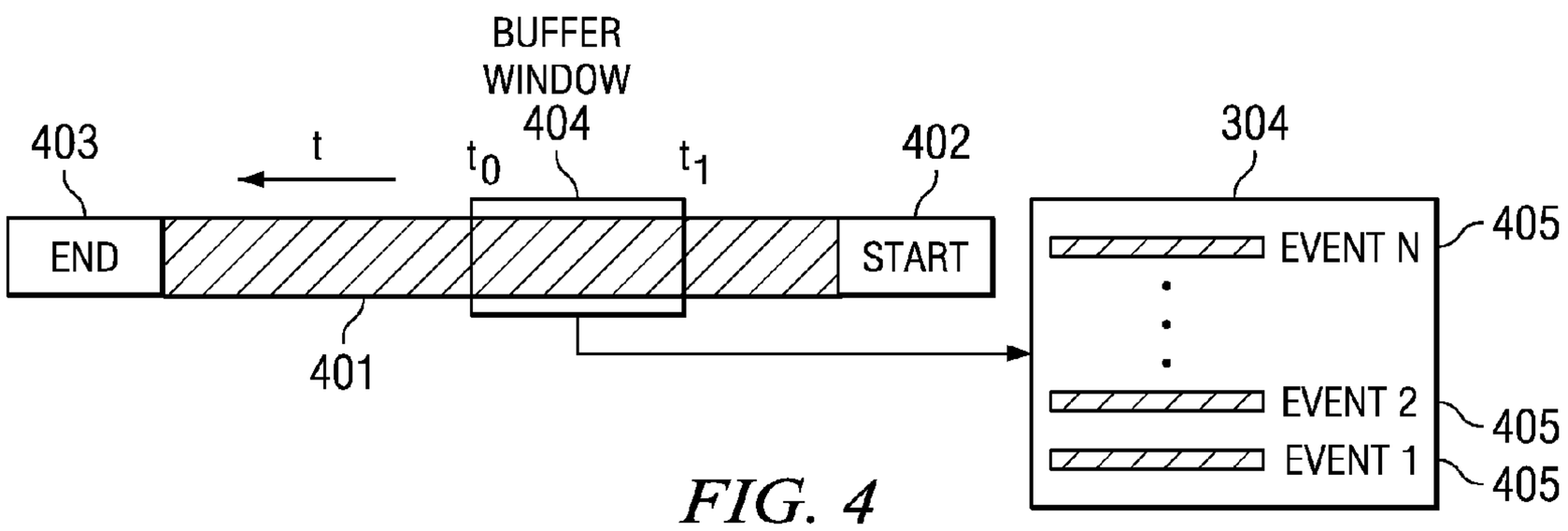


FIG. 4

SYSTEM AND METHOD FOR NAMING, FILTERING, AND RECALL OF REMOTELY MONITORED EVENT DATA

TECHNICAL FIELD

The present invention relates generally to a system and method for tagging data files and, more particularly, to a system and method for tagging and recalling video data files for a driver monitoring system.

BACKGROUND

Video monitoring of vehicle drivers and passengers is known; however, existing vehicle video monitoring systems do not provide easily useable video files for use by personnel who supervise drivers or review their behavior. Current systems merely provide a digital or analog recording for an entire driving shift without any markers, tags or other indication of where questionable driver behavior may be found in the recording. As a result, a supervisor or person analyzing driver behavior must view the video recording and/or exceptions for an entire shift, week, month, or longer to identify incidents of poor driving behavior, such as failure to use a seatbelt, use of a cell phone while driving, or failure to pay attention to the road, aggressive driving, and/or impact events. This method is very inefficient and difficult to use, particularly if the driver's shift is an entire workday, which may require the supervisor to review an 8 hour or longer video for each driver.

One known method for processing long video recordings of drivers is to have a third party review the entire recording and to break the recording into segments each time a new violation occurs. For example, the third party reviewer may watch the video for an entire driving shift and breaks the video file into separate sub-files each time the reviewer observes the driver in the video commit a violation, such as driving without a seatbelt, using a cell phone, or not paying attention to the road. In known systems, these sub-files are marked with minimal information, such as a date/time stamp, that is not helpful to a supervisor or reviewer who is looking for particular types of violations or who wants to prioritize his review to more serious violations.

SUMMARY OF THE INVENTION

The present invention is directed generally to a system and method for capturing video data, comprising buffering video data captured from a video recording device in a vehicle, detecting a triggering event, saving a portion of the video data occurring within a specified period of time near the event, and naming a saved portion of video data with a label associated with the triggering event. The video data may be video of a driver of a vehicle, occupants of a vehicle, or a view outside of the vehicle. The triggering event may be detected by a vehicle monitoring system mounted in the vehicle. The vehicle monitoring system may be coupled to an on-board diagnostic system in the vehicle, and the triggering event may be detected from data received from the on-board diagnostic system.

The triggering event may be detected using signals received from an on-board diagnostic system in the vehicle. This may be a speeding violation, an impact detection, a seatbelt warning, or a use of a wireless device, for example. The specified period of time captured in the saved video is configurable based upon a type of triggering event. The saved portion of video data may be a still image or may further include audio data. The saved portions of video data are provided to a database outside of the vehicle, for example, to be reviewed and analyzed.

In one embodiment a system and method of capturing vehicle video, comprises capturing video data associated with triggering events that occur in a vehicle, wherein the video data is a view of occupants of the vehicle, saving the video data as a file with a name corresponding to the associated triggering event, and providing one or more saved video data files to a database outside of the vehicle. The video data files may be reviewed, searched using the video data file name, grouped according to triggering events using the video data file name, prioritized for review using the video data file name, or searched for with a selected triggering event using the video data file name. The video data files may be provided to the database via a wireless connection, a hardwired connection, or via a memory storage device.

In another embodiment, a system for capturing vehicle video, comprises one or more video data recorders mounted in the vehicle, wherein the video data recorders provide a stream of video data, one or more buffers for capturing, at least temporarily, the video data streams from the one or more video data recorders, a vehicle monitoring system coupled to the one or more video data recorders and the buffers, and a video data storage device for storing video data files comprising at least a portion of a video data stream. The vehicle monitoring system identifies an occurrence of a preselected event and, in response, causes one or more video data files to be saved to the video storage device. The vehicle monitoring device is coupled to an on-board diagnostic system in the vehicle. The preselected event may be the occurrence of certain parameters in the on-board diagnostic system. The preselected event is a potential speeding violation, a potential collision, a potential seatbelt violation, or a potential use of a wireless device in the vehicle. The video data files are labeled using a term associated with an event that was detected at the time the video data was captured.

A method for saving video data captured in a vehicle, comprises saving a video data file comprising video captured from inside a vehicle within a selected period of time of an event, and naming the saved video data file using a label associated with the event.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawing, in which:

FIG. **1** is a block diagram of a system incorporating embodiments of the invention;

FIG. **2** is a diagram of the location of cameras used in embodiments of the invention;

FIG. **3** is a block diagram of a system incorporating embodiments of the invention; and

FIG. **4** is an illustration of video data capture according to embodiments of the invention.

DETAILED DESCRIPTION

The present invention provides many applicable inventive concepts that can be embodied in a wide variety of specific contexts. The specific embodiments discussed are merely illustrative of specific ways to make and use the invention, and do not limit the scope of the invention.

With reference now to FIG. **1**, there is shown a vehicle **101** in which a vehicle monitoring device is installed. The moni-

toring device may be self contained, such as a single unit mounted on a windshield **105** or dashboard **106**. Alternatively, the monitoring device may include multiple components, such as a processor or central unit mounted under a car seat **103** or in a trunk **104**. Similarly, the monitoring device may have a self-contained antenna in the unit (**105**), or may be connected to remotely mounted antennas **107**. The vehicle monitoring units may be connected to an on-board diagnostic (OBD) system **102** or bus in the vehicle. Information and data associated with the operation of the vehicle may be collected from the OBD system,**102**, such as engine operating parameters, vehicle identification, seatbelt use, door position, etc. The OBD system **102** may also be used to power the vehicle monitoring device. In one embodiment, the vehicle monitoring device is of the type described in U.S. patent application Ser. No. 11/805,237, filed on May 22, 2007, entitled "System and method for Monitoring Vehicle Parameters and Driver Behavior," the disclosure of which is hereby incorporated by reference herein.

The vehicle monitoring system may include a camera or any other digital video recording device. Referring to FIG. **2**, the camera may be mounted on the vehicle's dashboard **201**, windshield **202**, headliner **203**, or any other location that allows for video capture of at least the driver of the vehicle while the vehicle is in operation. The camera may be incorporated into a vehicle monitoring device that is mounted on the vehicle's windshield **105** or dashboard **106**. Alternatively, a camera sensor mounted on a dashboard or windshield may be coupled to a remotely mounted vehicle monitoring device **103**, **104**. The recorded video information may be stored at the camera location (e.g. **105**, **106**) or in a remote monitoring device (e.g. **103**, **104**).

The video data may also be transmitted in real-time or at intervals from the vehicle monitoring system to a central monitoring system or server for storage and/or processing. For example, the video may be transmitted to server **109** via communication network **108**, which may be a cellular, satellite, WiFi, Bluetooth, infrared, ultrasound, short wave, microwave or any other suitable network. Server **109** may process the video data and/or store the video data to database **110**, which may be part of server **109** or a separate device located nearby or at a remote location. Users can access the video data files on server **109** and database **110** using terminal **111**, which may be co-located with server **109** and database **110** or coupled via the Internet or other network connection. Is some embodiments, the video data captured by the monitoring system in vehicle **101** may be transmitted via a hardwired communication connection, such as an Ethernet connection that is attached to vehicle **101** when the vehicle is within a service yard or at a base station. Alternatively, the video data may be transferred via a flash memory, diskette, or other memory device that can be directly connected to server **109** or terminal **111**.

Video data formats are well known and it is understood that the present invention may use and store video data in any compressed or uncompressed file format now known or later developed, including, for example, the Moving Picture Experts Group (MPEG), Windows Media Video (WMV), or any other file format developed by the International Telecommunication Union (ITU), International Organization for Standardization (ISO), International Electrotechnical Commission (IEC) or other standards body, company or individual.

In one embodiment of the invention, the captured video is used to monitor, mentor or other wise analyze a driver's behavior during certain events. For example, if the vehicle is operated improperly, such as speeding, taking turns too fast, colliding with another vehicle, or driving in an unapproved area, then a supervisor may want to view the driver video recorded during those events to determine what the driver was doing at that time and if the driver's behavior can be improved. Additionally, if the driver's behavior is inappropriate or illegal, such as not wearing a seatbelt or using a cell phone while driving, but does not cause the vehicle to operate improperly, a supervisor may also want to review the video recorded during those events. Accordingly, it would be helpful to a user, such as a supervisor, fleet manager, driving instructor, parent, vehicle owner or other authority (collectively hereinafter a "supervisor") to have the capability to quickly identify a portion of a driver video record that is associated with such vehicle misuse or improper driver behavior. The supervisor could then analyze the video and provide feedback to the driver to correct the improper or illegal driving behavior.

FIG. **3** is a block diagram of one embodiment of a video capturing system according to one embodiment of the invention. Vehicle monitoring device **301** is mounted anywhere appropriate in the vehicle. Camera or digital video recording device **302** is mounted on the windshield, dashboard, or headliner, for example, so that the driver will be in the field of view. Camera **302** outputs a stream of video data to video data buffer **303**. When commanded by vehicle monitoring device **301**, video data buffer **303** stores portions or clips of the video data stream to video data storage **304**. The video data stream may also, or alternatively, be fed directly to video data storage **304** so that most or all of the video stream is captured. In one embodiment, the video data stream corresponds to video of the driver that is captured during operation of the vehicle.

Video of the passengers and other occupants of the vehicle may also be captured in addition to the driver video data. In other embodiments, more than one camera or video recording device is used in order to capture multiple views simultaneously, such as, for example, a driver view, a passenger view, a view looking forward out of the vehicle, an instrument panel view, and/or a side view. The camera mounting locations are not limited to the windshield, dashboard or headliner, but may be placed anywhere inside or outside of the vehicle and may be oriented to view into or out of the vehicle. Accordingly, multiple video data streams, clips or files may be provided to video data buffer **303** and video data storage **304**. Alternatively, separate video data buffers **303** and video data storage devices **304** may be assigned to one or more different video data streams.

Vehicle monitoring device **301** is coupled to camera **302**, video data buffer **303**, and video storage device **304**. These may be separate components, one single component, or various ones of the components may be combined into one device. It will be understood that camera **302** may be any video capture device or equipment. Moreover, video data buffer **303** and video storage device **304** may be any appropriate data buffering and storage devices. Vehicle monitoring device **301** detects predetermined events, such as a collision, a speeding violation, or a disconnected seatbelt, and causes video data buffer to capture video data associated with the triggering event. That event video data is then stored to video data storage device **304**. The event video data may be one or more still images or a video clip of any preselected length. Preferably, the event video data files are named so that they may easily be searched, identified and recalled by a supervisor. For example, if a speeding violation was detected, the associated event video data clip might be named or labeled "Speeding," "Speeding Violation," or "Speeding x MPH" where "x" is a maximum speed recorded or a speed differential over a posted speed limit.

U.S. patent application Ser. No. 11/805,238, filed May 22, 2007, entitled "System and Method for Monitoring and Updating Speed-By-Street Data," which application is hereby incorporated by reference herein in its entirety, describes the use of speed-by-street data to identify the specific speed limits on a particular street. The vehicle's owner, fleet manager, or other authority may set speeding thresholds that will trigger the capture of video clips associated with speeding. Static thresholds, such as speeds over 70 MPH, and dynamic thresholds, such as speeds 10 MPH over a posted speed limit, may be set. When vehicle monitoring device **301** determines that the vehicle is currently speeding, such as when a speeding threshold is met, an event trigger will be sent to video data buffer **303** causing a video data file associated with that speeding event to be stored to video data storage device **304** and labeled with an appropriately usable file name.

Vehicle monitoring device **301** may send information identifying the triggering event to video data buffer **303** or video data storage device **304** for use in naming the event video files. Either or both of video data buffer **303** or video data storage device **304** may be configured to name the event video files. Alternatively, vehicle monitoring device **301** may determine the appropriate name or label and provide that information to video data buffer **303** or video data storage device **304** to name the stored file. Other information or criteria in addition to triggering event identifier may be provided to name the file. For example, if a collision or impact is detected, the event video data may be simply named "Collision" or "Possible Impact." If additional information is available from monitoring device **301**, a more detailed label may be generated, such as "Collision—forward quarter," "Rear Impact," or "Impact Delta V x" where "x" is a measured or observed Delta V during the collision.

As disclosed in the above-cited U.S. patent application Ser. No. 11/805,237, one embodiment of the vehicle monitoring device receives inputs from accelerometers and/or a crash data recorder that measures "g" forces on the vehicle. These forces may indicate collisions, turning too fast, jackrabbit starts, hard braking or other extreme driving maneuvers. If the vehicle monitoring system detects such forces or identifies a potential collision or impact, an event trigger will be sent to video data buffer **303** causing a video data file associated with that acceleration or impact event to be stored to video data storage device **304** and labeled with an appropriately usable file name.

The device could be collecting video continuously to a buffered memory and once a specified event threshold is exceeded the device collects some configurable amount of video in the past as well as some configurable amount of video into the future (post infraction) and then saves said video to a file whereas the infraction that caused the data capture is coded into the file name. In the alternative, the device could be off and quickly triggered once an infraction or activity of interest is detected. However, such an arrangement would prevent the capture of, video of past events.

FIG. **4** illustrates the processing and storing of video data according to exemplary embodiments of the invention. Video data stream **401** represents the video data captured by camera **302** and provided to video data buffer **303**. Video data stream **401** may be in any appropriate format. Video data stream **401** begins at start time **402**, which may correspond to the movement of the vehicle's key to an "on" or "ignition" position, the start of the vehicle's engine, the start of a selected route, entry into a designated area, a predetermined time, or any other time event. Video data stream **401** flows in the direction "t" illustrated until end **403**, which may correspond to the movement of the vehicle's key to an "off" position, the shutdown of the vehicle's engine, the end of a selected route, exit form a designated area, a predetermined time, or any other time or event.

Buffer window **404** represents an amount of video data that is stored in video data buffer **303**. Accordingly, a portion of the video data stream **401** from the current time (t_0) to some time in the past (t_1) is captured in the video data buffer **303**. The period from t_0 to t_1 is the size of the buffer window, such as 15 seconds, 30 seconds, 2 minutes, etc. The buffer window size may be adjustable depending upon the detected event and the supervisor's settings. For example, the supervisor may not want to view any video clips longer than 30 seconds, so the video buffer is set to a 30 second size. Whenever a triggering event is detected, such as speeding or a collision, the data in the video buffer is captured and stored to video data storage device **304**. This allows the supervisor to later observe some period of time (e.g. 30 seconds) leading up to the event. The video buffer and video storage device may be further configured to allow additional video to be captured following the triggering event so that the supervisor may observe some period of time before and after the event. For example, if the buffer size was 30 seconds and the system was configured to capture 10 seconds of video following the triggering event before storing the video clip, then the supervisor could later view the 20 seconds leading up to the event and 10 seconds after the event.

It will be understood that the size of buffer window **404** and the amount of video data captured to individual data files is configurable and may be of any size supported by the available equipment. In another embodiment, the type of triggering event may determine how much time the video clip should capture. Vehicle monitoring device **301** may receive inputs from the vehicle OBD, such as a seatbelt warning, and inputs from other sensors, such as a cell phone use detector. If the driver or a passenger does not use his or her seatbelt, vehicle monitoring device **301** will detect the seatbelt warning on the OBD bus. If the cell phone use detector observes a wireless device being used in or near the vehicle, an input is sent to the vehicle monitoring device **301**. In either case, vehicle monitoring device **301** sends a event trigger to video data buffer **303** to capture the driver video. A supervisor may not want to watch 30 seconds or more of the driver talking on a cell phone or not wearing a seatbelt. Instead, they simply need to visually confirm that the violation occurred. Accordingly, the system may be configured to capture a shorter video clip, such as 10 seconds, or a still image when a seatbelt, cell phone use or similar event is detected. On the other hand, for speeding violations, collisions, and aggressive driving triggers, the system may be configured to capture longer video clips.

As illustrated in FIG. **4**, the captured video clips **405** are stored to video data storage device **304**. Each video clip, which may be of any length or may be a still image, is named so that the files may be easily searched and recalled, as noted above. For example, seatbelt and cellular phone use may simply be named "seatbelt" or "cell phone," while other events, such as speeding and collisions may be assigned more detailed names. Additional information, such as a date/time stamp, driver name, vehicle identifier, fleet identifier, or the like may also be added to the file name or as additional data added to the file itself. The additional information may be visible or not visible when the video clip is played or observed.

Video data storage **304** may be located in the vehicle and, at the end of the shift, trip or route (**403**), video clips **405** may be transferred to server **109** or database **110** (FIG. **1**), such as by wireless communication over network **108** or by hardwire

or Ethernet connection. Vehicle monitoring device **301** may also have a USB port, memory card slot, diskette recording device or other equipment for transferring video clips to a flash drive, memory card, diskette, compact disk, or other memory device. Video clips **405** may then be loaded to server **109** or database **110** directly or remotely, for example, via terminal **111**.

Once the video clips are loaded to server **109** and/or database **110**, a supervisor may review all of the video files for a particular shift, trip, or route. The files for a particular driver, group of drivers, day, group of day, vehicle, fleet, or all the video files may also be viewed. The supervisor may search, sort and prioritize the video clips using the file names. For example, if the supervisor wanted to see all video clips associated with speeding, the word "speed" could be used as a search term, using any standard file search tool, to find all of the speeding video clips. Similarly, reports on the video clips could be generated using the file names, such as whether there were incidents of speeding, collisions, seatbelt misuse, or the like during a particular shift. The file naming convention described herein allows the supervisor to immediately identify the relevance of each video file and to recall only those files of interest.

Any event or time can be selected as a trigger for capturing video data. It is expected that different users may configure a vehicle monitoring system to capture specific events based upon their use of the vehicle. For example, a parent may configure the device to capture video of potential speeding, impact, seatbelt, and cell phone use violations or events. On the other hand, a fleet operator may record video of those events in addition to capturing video of other events, such as video from particular routes, stops, deliveries, or pick-ups. The monitoring system may be configured to use any OBD data or other sensor data to trigger video capture. For example, if the OBD senses an open vehicle door or if a specific sensor is installed to detect when a vehicle door opens, that event can be used to trigger video capture of the driver and vehicle occupants, which may be useful for example in the taxi, livery, bus, or other commercial transportation industries. Similarly, the start of a taxi meter my trigger video capture of the vehicle occupants.

Additionally, the opening and/or closing of a driver's door and/or passenger door may also constitute a triggering event. Also, the sitting position and/or feedback from seat sensors regarding weight, posture, placement, and/or positioning may constitute a trigger-able event. For example, detecting a condition indicating that a child is riding in the front seat, such as the passenger's positioning, posture, weight, and/or the like, may trigger video capture of the passenger seat occupant. It will be understood that any exception condition or parameters may be selected to trigger video recording and that the captured video files may be named using a descriptive or meaningful label or tag associated with the triggering event.

The present invention may also be used to capture audio data in addition to or instead of video data. The audio data may be captured using microphones mounted with the video recording device or using separate microphones. The audio data may be saved in the same data file as the corresponding video data, or may be saved in separate audio data files. The audio data files may be named in the same descriptive manner as described herein for video data files.

Table 1 illustrates a list of file names for saved video clips according to one embodiment of the invention. The saved video clips are labeled so that the video clip can be correlated to specific violations. The file names illustrate that, for this example trip on May 21, 2006, the driver failed to use a seatbelt at the beginning of the drive at 3:01 PM. The time and date stamp may be as specific as desired by the user, such as including the year and seconds as shown. Alternatively, the file name may just include the violation type without any further details, or may include a sequential identification of the violations, such as "Speeding 1," "Speeding 2," "Speeding 3" etc. If the seatbelt remains unattached, the system may be configured to record and label an appropriate video clip every 15 minutes or some other longer or shorter repetition interval to prevent a constant stream of seatbelt violations from being recorded.

TABLE 1

VHCL1_SEATBELT_052106_15.01.04
VHCL1_SPEED_052106_15.21.56
VHCL2_CELL PHONE_052106_15.36.06
VHCL2_SPEED_052106_15.36.40
VHCL1_BRAKE_05212006_15.25.16
VHCL2_SPEED_052106_16.35.21
VHCL3_HARD ACCEL_052106_17.15.56
VHCL1_SPEED_052106_16.52.06
VHCL2_BRAKE_05212006_17.25.16
VHCL2_IMPACT_052106_17.25.18

The vehicles or drivers in the example shown in Table 1 are identified in the file name using the VHCLx field. This identifier could be a vehicle's fleet number, license number, VIN, the number of the vehicle monitoring unit's cell, satellite, or modem, or a driver identifier. The video files may be searched and sorted by the vehicle/driver identifier field, which allows files from multiple vehicles to be processed or reviewed at the same time. In Table 1, video file names for data from three vehicles are illustrated. These vehicles had potential speeding, acceleration, seatbelt and cell phone violations.

Additional detail may be included in the file name, such as a speeding amount, such as "Speeding 10" or "Speeding 15," to show the extent of the speeding violation. The driver clips of Table 1 show that the driver had a hard brake (i.e. deceleration) and an impact or collision at 17:25 PM. If the system assigned file names as shown in Table 1, then the user could jump straight to content of interest, such as to view the video of an impact. Alternatively, the file listing could be sorted, searched, or otherwise organized using commonly available file search tools.

Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the invention as defined by the appended claims. Moreover, the scope of the present application is not intended to be limited to the particular embodiments of the process, machine, manufacture, composition of matter, means, methods and steps described in the specification. As one of ordinary skill in the art will readily appreciate from the disclosure of the present invention, processes, machines, manufacture, compositions of matter, means, methods, or steps, presently existing or later to be developed, that perform substantially the same function or achieve substantially the same result as the corresponding embodiments described herein may be utilized according to the present invention. Accordingly, the appended claims are intended to include within their scope such processes, machines, manufacture, compositions of matter, means, methods, or steps.

What is claimed is:

1. A computer-implemented method for monitoring, recording and storing various types of event data detected during operation of a vehicle in a manner that facilitates

retrieval of stored event data by selecting for a particular vehicle retrieval of one or more types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle, the computer-implemented method comprising:

detecting at one or more sensors installed in a vehicle one or more parameters from which data is derived that defines various types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle;

for each type of event, configuring a time period over which a triggered event is to be recorded;

receiving at a processing system inputs from said one or more sensors, the inputs from said one or more sensors being analyzed by one or more processors of the processing system to determine triggering events that determine when an event type is to be recorded and stored;

recording at one or more digital video monitors installed in the vehicle one or more behaviors for at least one of the vehicle operator, the vehicle passenger, a view inside the vehicle, or a view outside the vehicle;

for each instance of a triggering event, storing in a data storage device a portion of digital video recorded over the configured time period for the triggered event, and storing the recorded portion of digital video in a digital format that is identified by the type of event that is triggered; and

for a given vehicle, and for a selected type of event, retrieving from data storage for separate presentation all stored instances of the recorded digital video for a selected type of event over a given time period.

2. The method of claim **1**, wherein the configured time period includes at least one of a time prior to the event and a time after the event.

3. The method of claim **1**, wherein the configured time period includes at least both a time prior to the event and a time after the event.

4. The method of claim **1**, wherein the video data is video of a driver of the vehicle.

5. The method of claim **1**, wherein the video data is video of one or more passengers of the vehicle.

6. The method of claim **1**, wherein the video data is video of a view outside of the vehicle.

7. The method of claim **1**, wherein the processing system in included in a vehicle monitoring system mounted in the vehicle.

8. The method of claim **7**, wherein the one or more sensors are part of an on-board an on-board diagnostic system in the vehicle, and wherein the on-board diagnostic system is coupled to the vehicle monitoring system.

9. The method of claim **7**, wherein the data storage device is included in the vehicle monitoring system.

10. The method of claim **9**, wherein a database is stored outside of the vehicle, and wherein the method further comprises transmitting from the vehicle monitoring system to the database the portion of digital video recorded for each triggering event.

11. The method of claim **10**, wherein the transmission is wireless.

12. The method of claim **11**, wherein the transmission is automatically initiated by the vehicle monitoring system when the vehicle is returned to a fleet vehicle base.

13. The method of claim **10**, wherein the stored portion of digital video is temporarily stored in a buffer and then automatically wirelessly transmitted from the buffer to the database.

14. The method of claim **1**, wherein at least one of the triggering events is a speeding violation.

15. The method of claim **1**, wherein at least one of the triggering events is an impact detection.

16. The method of claim **1**, wherein at least one of the triggering events is a seatbelt warning.

17. The method of claim **1**, wherein at least one of the triggering events is a detection of a use of a wireless device.

18. The method of claim **1**, wherein at least one of the triggering events is detected by a seat sensor.

19. The method of claim **18**, wherein an input that is used to detect the triggering event from the seat sensor is selected from the group consisting of:

a weight;

a passenger size;

an occupant's position;

an occupant's posture; and

a placement of an object on a seat.

20. The method of claim **1**, wherein the stored portion of video data is a still image.

21. The method of claim **1**, wherein the stored portion of video data comprises audio data.

22. The method of claim **1**, further comprises retrieving from data storage all stored instances of the recorded digital video for each type of event over a given time period, and prioritizing presentation of the retrieved instances based on the types of events.

23. A system for monitoring, recording and storing various types of event data detected during operation of a vehicle in a manner that facilitates retrieval of stored event data by selecting for a particular vehicle retrieval of one or more selected types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle, the system comprising:

one or more sensors installed in a vehicle for detecting one or more parameters from which data is derived that defines various types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle;

a processing system for configuring a time period over which a triggered event is to be recorded, and for receiving one or more inputs from said one or more sensors, the processing system comprising one or more processors digitally processing said inputs from said one or more sensors to determine triggering events that determine when an event type is to be recorded and stored;

one or more monitors installed in the vehicle for recording one or more behaviors for at least one of the vehicle operator, the vehicle passenger, a view inside the vehicle, or a view outside the vehicle;

a data storage device for storing a portion of digital video recorded over the configured time period for each instance of a triggering event, and for storing the recorded portion of digital video in a digital format that is identified by the type of event that is triggered; and

an output device for retrieval from data storage and for separate presentation all stored instances of the recorded digital video for a selected type of event over a given time period.

24. The system of claim **23**, wherein the configured time period includes at least one of a time prior to the event and a time after the event.

25. The system of claim **23**, wherein the configured time period includes at least both a time prior to the event and a time after the event.

26. The system of claim **23**, wherein the video data is video of a driver of the vehicle.

27. The system of claim **23**, wherein the video data is video of one or more passengers of the vehicle.

28. The system of claim **23**, wherein the video data is video of a view outside of the vehicle.

29. The system of claim **23**, wherein the processing system in included in a vehicle monitoring system mounted in the vehicle.

30. The system of claim **29**, wherein the one or more sensors are part of an on-board an on-board diagnostic system in the vehicle, and wherein the on-board diagnostic system is coupled to the vehicle monitoring system.

31. The system of claim **29**, wherein the data storage device is included in the vehicle monitoring system.

32. The system of claim **31**, wherein a database is stored outside of the vehicle, and wherein the method further comprises transmitting from the vehicle monitoring system to the database the portion of digital video recorded for each triggering event.

33. The system of claim **32**, wherein the transmission is wireless.

34. The system of claim **32**, wherein the transmission is automatically initiated by the vehicle monitoring system when the vehicle is returned to a fleet vehicle base.

35. The system of claim **32**, wherein the stored portion of digital video is temporarily stored in a buffer and then automatically wirelessly transmitted from the buffer to the database.

36. The system of claim **23**, wherein at least one of the triggering events is a speeding violation.

37. The system of claim **23**, wherein at least one of the triggering events is an impact detection.

38. The system of claim **23**, wherein at least one of the triggering events is a seatbelt warning.

39. The system of claim **23**, wherein at least one of the triggering events is a detection of a use of a wireless device.

40. The system of claim **23**, wherein at least one of the triggering events is detected by a seat sensor.

41. The system of claim **40**, wherein an input that is used to detect the triggering event from the seat sensor is selected from the group consisting of:

a weight;

a passenger size;

an occupant's position;

an occupant's posture; and

a placement of an object on a seat.

42. The system of claim **23**, wherein the stored portion of video data is a still image.

43. The system of claim **23**, wherein the stored portion of video data comprises audio data.

44. The system of claim **23**, wherein all stored instances of the recorded digital video for each type of event are retrieved for a given time period, and presentation of the retrieved instances is based on the types of events.

45. One or more digital storage devices containing computer-executable instructions for causing one or more processors of a computing system to implement a method for storing various types of event data detected during operation of a vehicle in a manner that facilitates retrieval of stored event data by selecting for a particular vehicle retrieval of one or more selected types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle, the computer-implemented method comprising:

receiving at a processing system inputs from any of a plurality of sensors installed in a vehicle, the sensors detecting parameters from which data is derived that defines various types of events related to at least one of i) operation of the vehicle, ii) use of vehicle equipment, iii) operator behaviors while in the vehicle, or iv) passenger behaviors while in the vehicle;

for each type of event, configuring at a processing system a time period over which a triggered event is to be recorded;

receiving at the processing system inputs from said one or more sensors, the inputs from said one or more sensors being analyzed by one or more processors of the processing system to determine triggering events that determine when an event type is to be recorded and stored;

recording at one or more digital video monitors installed in the vehicle one or more behaviors for at least one of the vehicle operator, the vehicle passenger, a view inside the vehicle, or a view outside the vehicle;

for each instance of a triggering event, storing in a data storage device a portion of digital video recorded over the configured time period for the triggered event, and storing the recorded portion of digital video in a digital format that is identified by the type of event that is triggered; and

for a given vehicle, and for a selected type of event, retrieving from data storage for separate presentation all stored instances of the recorded digital video for a selected type of event over a given time period.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,666,590 B2
APPLICATION NO. : 11/767325
DATED : March 4, 2014
INVENTOR(S) : Follmer et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

Column 3
Line 45, change “Is some” to --In some--
Line 65, change “other wise” to --otherwise--

Column 4
Line 50, change “various ones of the components may” to --various components that may--

Column 5
Line 56, change “of, video” to --of video--

Column 6
Line 41, change “a event” to --an event--
Line 64, change “storage **304**” to --storage device **304**--
Line 65, change “route (**403**)” to --route **403**--

Column 7
Line 40, change “my” to --may--

Column 9
Line 48, change “system in” to --system is--
Line 52, change “an on-board an on-board” to --an on-board--

Signed and Sealed this
Fifteenth Day of July, 2014

Michelle K. Lee

Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office